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Comparative evaluation of Instrumentation time and Child's behaviour after using Rotary, Reciprocating and Hand files in primary teeth using Frankel Behaviour rating in 5 –10 yrs old patients: An in -vivo study.

AUTHORS:

1.Dr Manish Bhalla 2. Dr. Ritika Malhotra 3. Dr. Jasmine Nanda

4. Dr. Sunayana Dutta 5. Dr. Anuja Goit 6. Dr. Kumari Ritika

1. Professor and Head, Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh
2. Professor, Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh
3. Professor, Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh.
4. PG 3rd year Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh.
5. Senior Lecturer, Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh.
6. PG 2nd year Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh

Corresponding Author

Dr Manish Bhalla

Professor and Head, Department of Pediatric and Preventive Dentistry, Inderprastha Dental College and Hospital, Ghaziabad, Uttar Pradesh

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ABSTRACT

INTRODUCTION: The principal goal in pediatric dentistry is to retain the primary teeth in the oral cavity until its physiological exfoliation to preserve the arch integrity . The choice of treatment for symptomatic decayed primary teeth is Pulpectomy in which conventionally hand files are used for cleaning and shaping but it is time-consuming and the increased length of the appointment may negatively influence the child's behavior during the treatment. Therefore, the aim of the study is to assess Instrumentation time and Child's behaviour after using Rotary, Reciprocating and Hand files in primary teeth using Frankel Behaviour rating in 5 –10 yrs. old patients.

MATERIAL AND METHOD: A total of 45 primary teeth were included in the study according to the inclusion criteria. They were divided randomly into 3 groups (Group-1 Hand files; Group 2- Rotary files; Group 3- Reciprocating files). During each procedure, instrumentation time was recorded using a stopwatch. The pre- and postoperative child's behaviour was assessed by an evaluator.

RESULTS: The analysis was performed by using One Way ANOVA test. A significant difference was found in instrumentation time. The mean biomechanical preparation time was observed to be significantly shorter in the paediatric rotary and reciprocating file groups as compared to hand file group.

CONCLUSION: The clinical performance of paediatric rotary and reciprocating files was found to be superior and the choice of file system did not significantly alter behaviour.

INTRODUCTION:

The principal goal in pediatric dentistry is to retain the primary teeth until its physiological exfoliation to preserve arch integrity as it also contributes to mastication, phonation, and esthetics and prevents deleterious habits in children.[1] Pulpectomy is a conservative treatment approach for primary teeth with necrotic or irreversibly inflamed pulp to prevent the premature loss of primary teeth.[2]

In the field of pulp therapy not only has the materials been improved but also the techniques and the instrumentation, reaching a better quality of work. Conventionally during pulpectomy Hand files are used for chemomechanical preparation. Although traditionally used, the use of hand files may be challenging due to narrow, curved canals in primary teeth with ongoing physiological resorption. The long duration of treatment time may negatively influence the child's behaviour.[3]

Therefore, the introduction of pediatric rotary systems may overcome the mentioned disadvantage with certain advantages when compared to conventional Hand files: 1. A decreased working time, which helps maintain patient cooperation. 2. The shape of the root

canal is more conical, favoring a higher quality of the root canal filling, and increasing clinical success. and may have improved canal centricity, conservative canal preparation with better obturation quality. So it is more convenient for the operator to manage the child using rotary files compared to Hand files because there can be reduction in the instrumentation time which will help in minimising the chairside time thereby positively influencing the child's behavior.[4]

Nowadays these single-file systems employ rotatory along with reciprocating motions too. Reciprocating motion is basically any back or forth motion, in clockwise and anticlockwise direction. Neoendo Reciprocation file is meant to be used in 150 degree counterclockwise direction and 30 degree clockwise direction . File rotates 150 degree in a cutting direction and then reverses 30 degree to release the stress. Angle of cutting direction is greater than the angle of stress release direction . This reduces the risk of instrument fracture.[5] The main advantage of such a motion is the reduction in the number of endodontic mishaps through instrument separation, which is primarily due to avoidance of continuous dentinal over engagement. The added advantages of these single-file systems include reduction in the working time, prevention of cross-contamination, and improved safety of the shaping procedures.[6] Therefore the aim of the study is to assess Instrumentation time and Child's behaviour after using Rotary, Reciprocating and Hand files in primary teeth using Frankel Behaviour rating in 5 –10 yrs old patients

MATERIALS AND METHOD

All patients between the age-group 5years and 10 years with primary molar teeth indicated for pulpectomy were chosen for the study. Teeth exhibiting one or more of the following with 2/3rd of the root remaining were included in the study—(a) necrotic pulp, (b) symptoms of irreversible pulpitis, and (c) radiolucencies in the periapical or furcation region. Teeth exhibiting one or more of the following were excluded from the study—(a) swelling, (b) excessive mobility, (c) cellulitis, (d) perforated pulpal floor, and (e) fistula.
Children lacking cooperative ability, those having a systemic illness, or special care needs were excluded from the study.

The subjects were divided into three groups using the block randomization (block of 3) technique. The randomization sequence was developed by a statistician and opaque envelopes were used for allocation concealment. The patients and parents were explained about the aim and nature of the study , the evaluator recording the instrumentation time and behavior was blinded. The principal operator performing the treatment could not be blinded as the treatment was being administered by the operator. Informed consent was obtained from each parent/guardian before the procedure and ethical clearance was obtained from the Departmental Review board. Non-pharmacological techniques of behavior management were used to alter the child's behavior and gain cooperation. Local anesthesia infiltration was done (2% lignocaine, 1:200,000 adrenaline). Access cavity preparation was done using No 2, 4-round bur, the pulp chamber was deroofed and orifices located using the DG-16 explorer. Size 10 K-file NiTi was used to determine canal patency. The working length was determined using the radiographic method and kept 1 mm short of the radiographic apex. Instrumentation in group I was done using hand K-files in a quarter pull turn motion. Instrumentation in group II was done using Kedo S Square rotary file which is the most advanced specialized pediatric file pediatric

system in the world, gives one advantage of finishing the treatment in less than 50% time compared to any other system in the world.

In group III, Neoendo reciprocating files were used for benefits of reciprocating motion for shaping canal. The irrigant used was normal saline. The canals were dried using sterile paper points and obturation was done using Metapex. The canals and chamber were cleaned using moist cotton pellets followed by seal using Glass Ionomer Cement.

The instrumentation time was recorded by an evaluator blinded to the treatment modality used for chemomechanical preparation. The child's behavior was also recorded

as per the modified Frankel Scale preoperatively and postoperatively by the evaluator.

FIGURES

Fig-1 Group 1 Hand k file N=15

Fig-2 Group 2 Kedo S Square pediatric rotary file N=15

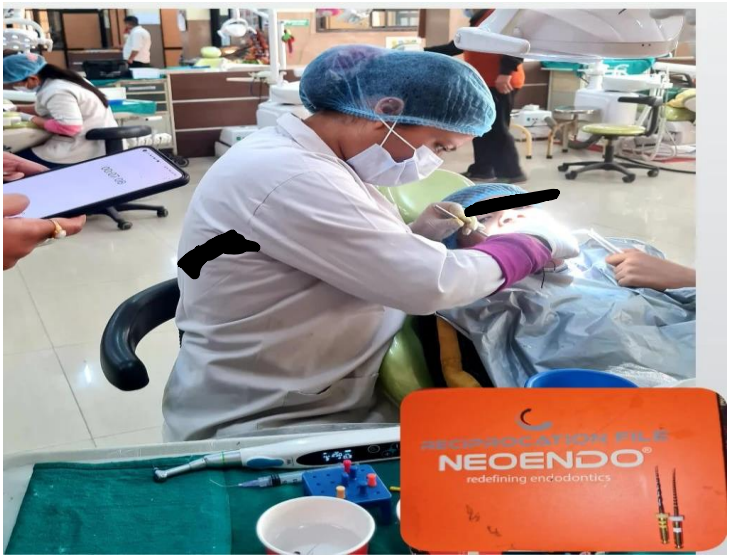

Fig-3 Group 3 Neoendo reciprocation rotary files N=15

RESULTS

The data were entered into digital spreadsheets and statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 16. Descriptive results were obtained in frequency (percentage) and mean ± standard deviation. the mean time for chemomechanical preparation was found to differ significantly among the three groups ($p < 0.0001$**). The mean time (in minutes) was 21.75 ± 7.08 for group I (hand K-flex files) was significantly higher than groups II and III.(Fig 1) The preoperative and postoperative behavioral comparison revealed no statistically significant difference among the three groups (p value > 0.05)

Modified Frankel scale used in the study to assess child's behavior[14]

• **Rating 1:** DEFINITELY NEGATIVE (−): Refusal of treatment, crying forcefully, fearful, or any other overt evidence of
extreme negativism.

• **Rating 2:** NEGATIVE (−): Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not
pronounced, i.e., sullen, withdrawn.

• **Rating 3:** NEGATIVE POSITIVE (−+): Fluctuation between uncooperativeness and some evidence of unpronounced
negative attitude, and cautious acceptance to treatment with reservation shifting throughout the visit.

• **Rating 4:** POSITIVE (+): Acceptance of treatment; at times cautious, willingness to comply with the dentist, at times
with reservation but patient follows the dentist's directions cooperatively.

• **Rating 5:** DEFINITELY POSITIVE (++): Good rapport with the dentist, interested in the dental procedures, laughing and
enjoying the situation.

Table 1 Mean instrumentation time using three different file systems

Group	Mean time	S.D.	Minimum time	Maximum time
Group I	21.75	1.98	18.3	27.05
Group II	14.25	1.37	12.0	15.56
Group III	13.29	0.78	12.07	14.45
p-value*	0.0001			
Group I v/s II**	0.001			
Group I v/s III**	0.001			
Group II v/s III**	0.249			

*One way ANOVA applied, **Post hoc Bonferroni applied, p-value significant at p<0.05

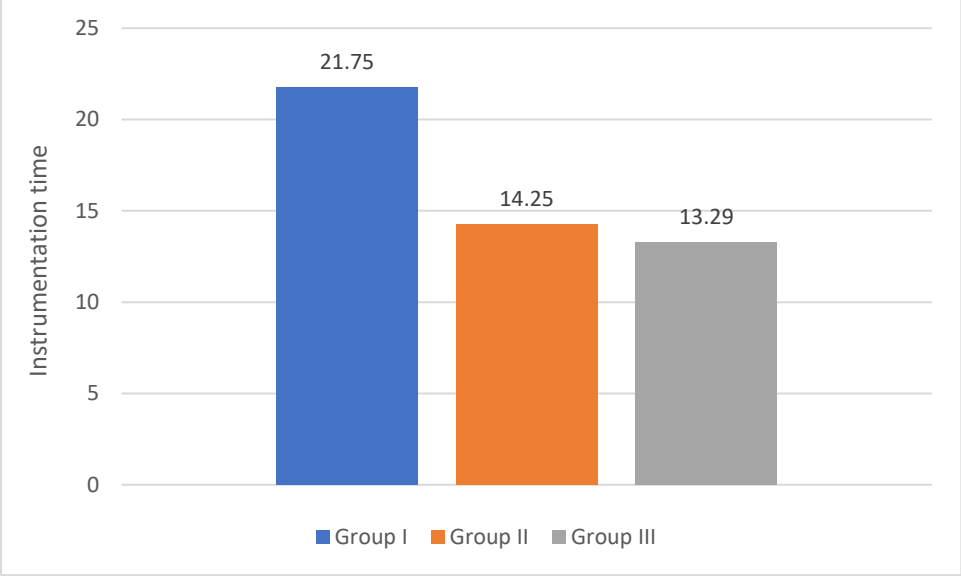

Fig-4: Group-wise comparison of the mean Instrumentation time

Table 2: Behaviour change before and after using three different file systems

	Preoperative		Postoperative	
	Mean	S.D.	Mean	S.D.
Group I	2.53	0.74	2.67	0.62
Group II	2.73	0.71	3.27	0.70
Group III	2.80	0.67	3.27	0.70
p-value	0.567		0.018*	

One way ANOVA applied, *p-value significant at p<0.05

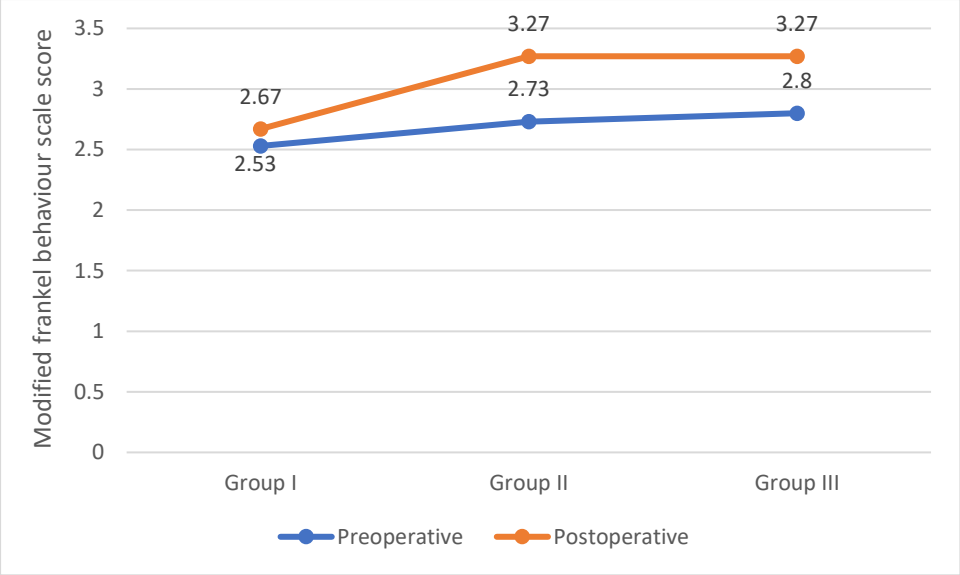

Fig. 5: Group-wise comparison of the mean pre- and postoperative behavior rating scores

DISCUSSION

The study intended to compare the instrumentation time of the hand ,rotary and reciprocating systems in primary molar teeth. A statistically significant reduction was found in the time required for chemo-mechanical preparation for both rotary systems and no statistically noticable significant variations were observed in the child's behavior among the three groups. The reduction in preparation time is due to the fact that less number of files are used with the rotary system as well as rotary files are engine powered and therefore, fast and can positively influence treatment because patient cooperation is not lost due to tiredness.

The rotary files have twice the taper than k files and this predetermined shape is marked in the root canal during instrumentation resulting in more conical canals than those prepared with conventional files.[7]

These findings are consistent with a study by Tyagi et al. which compared K-files, rotary Kedo-S files and wave one reciprocating file.[8]

A study by Morankar et al. compared instrumentation time between hand files (SS K-files) and Hyflex rotary files and found a significant reduction in instrumentation time using rotary files in primary molar teeth.[9]

Other studies which support the above-mentioned findings include Crespo et al.,Govindaraju et al.,and Makarem et al.[9,10]

On the contrary, Katge et al. reveal more instrumentation time using rotary two files *vs* hand H-files in an *in vitro* study on primary molars. Similar findings by Madan et al. attributed the increased time to the experience of the operator.[11]

Although the relative time required for instrumentation for both rotary groups was less compared to the hand file group, the reciprocating file system (group III) took the least time for biomechanical preparation among the three groups. The variations between the two rotary systems were not statistically significant.

The values of time taken in the present study were found to be overall less than previous studies Morankar et al.[4] and Panchal et al.[12]

In the present study, no statistically significant variations initial non-pharmacological strategies were observed in the child's behavior among the three groups. The author attributed this to the used with each child to ensure patient comfort before starting the procedure.

CONCLUSION

The study aimed to evaluate and compare the effect of hand, pediatric, and reciprocating file systems on instrumentation time,and child behavior. The overall performance of the rotary groups was found to be better than the hand file group.

• There is shorter instrumentation for rotary (both pediatric and reciprocating) over manual files.

• No significant differences in the child's behavior among the three groups.

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